

REMARKS

Claims 1-16 are pending. By this Amendment, claim 1 is amended. The amendment is supported by the specification and the claims as originally filed. No new matter is added.

Claims 1-3, 6-9 and 11-16 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Abusleme et al. (EP 1,038,914 A1) in view of Stoeppelmann (U.S. Patent No. 5,869,157). The rejection is traversed.

The present invention is directed to "[m]ultilayer manufactured articles comprising at least: A) a layer consisting essentially of thermoprocessable copolymers of ethylene with chlorotrifluoroethylene, and/or tetrafluoroethylene, and with acrylic monomers of formula $\text{CH}_2=\text{CH}-\text{CO}-\text{O}-\text{R}_2$ (a) ...; and B) a layer based on polyamides" (present claims 1 and 6). The fluoropolymer layer of A), which contains acrylic monomer (a) units, adheres to the layer of polyamide of B), which has:

- "-NH₂ end groups in the range of 40-300 µg/g" (not admixed with a diamine) (present claim 1 and Examples 1, 3 and 11); or
- "-NH₂ end groups lower than 40 µg/g, blended with 0.1-5% by weight of one or more diamines" (claim 6 and Examples 8, 9 and 12),

after the formation of the multilayer without any crosslinking agent or any supplemental treatment.

Applicants have found that when an ethylene-chlorotrifluoroethylene (E/CTFE) fluoropolymer does not contain acrylic monomer (a) units, i.e., consists only of E and CTFE monomers (e.g. Halar[®]), the E/CTFE fluoropolymer does not adhere to both the

common polyamides (see comparative Example 4) and to the presently claimed polyamides (see comparative Examples 5 and 10).

To this effect, Applicants respectfully submit that there is no suggestion or motivation for those of skill in the art to use the polyamides of Stoeppelmann as the adhesion promoters in the multilayer of Abusleme et al. Instead, Applicants submit that Stoeppelmann teaches away from the presently claimed invention.

Stoeppelmann states that “[i]t is therefore an object of the invention to provide polyamide-based adhesion promoters that tightly connect thermoplastically workable flouropolymers” (Stoeppelmann, column 2, lines 33-35). Stoeppelmann then states the following:

The objective of the present invention is achieved by an adhesion promoter composition based on a polyamide having an **excess of amino end groups** i.e. whose ratio of amino-end groups to carboxyl end groups lies in the range of 1.5:1 to 3:1, and wherein **at least one diamine is added** to the polymerized polyamide in an amount of 0.25 to 2 weight percent. ... This adhesion promoter composition tightly joins thermoplastically workable flouropolymers ... with polyamides.

(Stoeppelmann, column 2, lines 53-64) (emphasis added). Further, Stoeppelmann states that the “connection between the individual [polyamide] tube layers takes effect **after** the tube **extrusion**” (Stoeppelmann, column 1, lines 32-35) (emphasis added).

As such, Stoeppelmann requires polyamides having an excess of -NH_2 end groups with respect to -COOH and admixed with a diamine, which adhere to fluoropolymers directly after co-extrusion. In contrast, the presently claimed invention requires polyamides having an excess of -NH_2 end groups and no diamines (claim 1) or

having a balanced amount of -NH_2 end groups blended with one or more diamines (claim 6).

Further, Stoeppelmann specifically teaches away from the polyamides of the presently claimed invention. Stoeppelmann states that “when a polyamide ... with an excess of amino end groups is used without a diamine or when a polyamide ... balanced in amino end groups, is utilized together with diamine as the adhesion promoter ... adequate adhesion cannot be achieved after the coextrusion process” (Stoeppelmann, column 3, lines 5-10 and column 4, lines 19-24). Instead, Stoeppelmann notes that “adhesion is only achieved following annealing at 100-140 C. or after being stored for several days at room temperature” (Stoeppelmann, column 4, lines 24-26). Thus, supplemental treatments are required to achieve adhesion of the resulting multilayers, as polyamides having balanced -NH_2 and -COOH admixed with diamine do not allow for adhesion directly after extrusion.

As such, Applicants submit that Stoeppelmann teaches away from the use of the polyamides of the presently claimed invention, as they do not allow for adhesion directly after extrusion and are industrially disadvantageous in that they need further expensive treatments of annealing or storage for several days when coupled with fluoropolymers.

Further, Applicants have unexpectedly found that the presently claimed polyamides, which were considered unsuitable by Stoeppelmann, (i.e., polyamides having balanced -NH_2 end groups admixed with diamine (see Examples 8, 9 and 12) or polyamides having an excess of -NH_2 end groups not admixed with diamine (see Examples 1, 3, 6 and 11) adhere, after the formation of the multilayer, only to one

particular fluoropolymer selected among the numerous fluoropolymers, without requiring any supplemental treatment to achieve complete adhesion. See the working examples.

As Stoeppelmann reputes polyamides having balanced -NH_2 end groups admixed with diamine as unsuitable to adhere to a fluoropolymer, Applicants submit that those of skill in the art would not have found any motivation in Stoeppelmann to use such polyamides in the multilayer of Abusleme et al. formed of a fluoropolymer and a polyamide to obtain adhesion.

As far as the polyamides having an excess of -NH_2 end groups not admixed with diamine (i.e., the second polyamide above mentioned), Applicants have demonstrated that diamine is not an essential technical feature to assure the adhesion when the fluoropolymer is E/CTFE (or E/TFE) containing acrylic monomer (a) and the polyamide having -NH_2 end groups higher than $40 \mu\text{g/g}$ as the presently claimed invention (see Examples 1 and 11).

The table in column 6 of Stoeppelmann actually demonstrates that when using polyamide having at least $\text{-NH}_2 = 40 \mu\text{g/g}$ and unadmixed with a diamine, as required by claim 1, there is no adhesion to fluoropolymer. The table also demonstrates that when using polyamide having -NH_2 end groups with a content of higher than 40 and admixed with diamine, there is adhesion to fluoropolymer. The table in column 6 of Stoeppelmann can be summarized as follows:

EX. 1 (comparative)	exemplifies a polyamide PA1 having $\text{NH}_2=50 \mu\text{g/g}$ and $\text{COOH}=20 \mu\text{g/g}$ not admixed with a diamine (PA1 of example 1); wherein $\text{NH}_2/\text{COOH} = 2.5$, NH_2 is in excess according to the teaching of Stoeppelmann; said polyamide showing no adhesion after co-extrusion.
------------------------	--

EX. 2	exemplifies polyamide PA2 having $\text{NH}_2=40 \mu\text{g/g}$
-------	---

(comparative)	and COOH=30 µeg/g (PA2) not admixed with a diamine; wherein $\text{NH}_2/\text{COOH} = 1.33$, said ratio being outside the claimed range, i.e., <u>not in excess</u> ; said polyamide showing no adhesion after co-extrusion.
EX. 3	exemplifies the PA1 of ex. 1 but admixed with diamine (PA3).
EX. 4	Exemplifies the PA1 of ex. 1 but admixed with a different diamine (PA4).

(Stoeppelmann, column 5, lines 42-56 and column 6, table).

Applicants have unexpectedly found that the comparative polyamides of Stoeppelmann adhere only to the instant fluoropolymer E/CTFE containing acrylic monomer (a) (see Example 3). As such, Applicants submit that Stoeppelmann teaches away from the presently claimed invention.

Next, Abusleme et al. discloses "melt-processable curable compositions, comprising thermoprocessable copolymers of ethylene (E) with tetraflouroethylene (TFE) and or chlorotriflouorethylene (CTFE) modified with acrylic monomers ... Said crosslinkable compositions adhere to hydrogenated polymers" (Abusleme et al., page 2, lines 5-8). Further, Abusleme et al. discloses that "[e]xamples of hydrogenated polymers are polyamides, polyvinylchloride, nitrile rubbers (NBR)" (Abusleme et al., page 2, line 12).

Abusleme et al. also discloses that flouropolymer E/CTFE containing acrylic monomer (a) does not show adhesion to polyamide ("polymer D" was defined as polyamide 12 (see Abusleme et al., page 7, paragraph 55)) in the absence of a crosslinking agent (Abusleme et al., comparative Example 8 on pages 7-8). As such, Abusleme et al. teaches away from the multilayer of the claim 1, having a layer

consisting of a polyamide and a layer consisting of E/CTFE (or E/TFE) containing acrylic monomer (a) without any crosslinking agent.

In contrast to the disclosure of Abusleme et al., Applicants have found that adhesion can be possible through the use of particular polyamides having a content of -NH_2 end groups higher than 40 $\mu\text{g/g}$, which adhere to said E/CTFE containing acrylic monomer (a) without any crosslinking agents (see Examples 1 and 3 in comparison with comparative Example 2).

As Abusleme et al. and Stoeppelmann teach away from the presently claimed invention, Applicants respectfully submit that claim 1 would not have been obvious to those of skill in the art to use the polyamides of Stoeppelmann, which are unsuitable to adhere to fluoropolymer after co-extrusion, in the multi-layer of Abusleme et al. in replacement of the cross-linking agent. Further, Applicants submit that dependent claims 2-3 and 6-16 are patentable for at least the same reasons. Thus, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-3, 6-9 and 11-16 under 35 U.S.C. § 103(a) as unpatentable over Abusleme et al. in view of Stoeppelmann.

Claim 10 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Abusleme et al. in view of Stoeppelmann as applied to claim 1, and further in view of Krause et al. (U.S. Patent No. 5,958,532). The rejection is traversed.

Applicants submit that dependent claim 10 is patentable for at least the same reasons as claim 1 (please see the discussion above). Further, Applicants submit that Abusleme et al., Stoeppelmann and Krause et al. do not teach or suggest multilayer

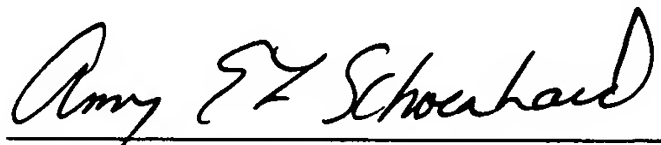
articles comprising polyamides having a content of -NH₂ end groups between 40-300 µeg/g, as required by claim 10 (as claim 10 is dependent on claim 1).

As Abusleme et al., Stoeppelmann and Krause et al. do not teach or suggest all of the elements of claim 10, Applicants respectfully submit that those of skill in the art would not have found claim 10 obvious over the disclosure of these references. Thus, Applicants respectfully request reconsideration and withdrawal of the rejection of claim 10 under 35 U.S.C. § 103(a) as obvious over Abusleme et al. in view of Stoeppelmann as applied to claim 1, and further in view of Krause et al.

In view of the amendments and remarks above, Applicants respectfully submit that this application is in condition for allowance and request favorable action thereon. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event this paper is not considered to be timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300, referring to Attorney Docket No. 108910-00057. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 01-2300, referencing Attorney Docket No. 108910-00057.

Respectfully submitted,



Amy E. L. Schoenhard
Registration No. 46,512

Customer No. **004372**
ARENT FOX PLLC
1050 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810

TECH/253922.1